(FILE 'HOME' ENTERED AT 11:12:06 ON 14 OCT 2003)

FILE 'CAPLUS' ENTERED AT 11:12:17 ON 14 OCT 2003
L1 245892 S ELECTROPHOR?
L2 231479 S FIELD (W) (INTENSITY OR STRENGTH) OR GRADIENT#
L3 15034 S L1 AND L2
L4 38 S FIELD (W) (INTENSITY OR STRENGTH) (W) GRADIENT#
L5 11 S L1 AND L4

=> d l5 3 4 5 7 8 bib ab

L5 ANSWER 3 OF 11 CAPLUS COPYRIGHT 2003 ACS on STN
AN 1999:733466 CAPLUS
DN 132:176309
TI DNA sequencing by capillary array **electrophoresis** with an electric **field strength gradient**
AU Endo, Y.; Yoshida, C.; Baba, Y.
CS Faculty of Pharmaceutical Sciences, Department of Medicinal Chemistry, The University of Tokushima, Shomachi, Tokushima, Japan
SO Journal of Biochemical and Biophysical Methods (1999), 41(2-3), 133-141
CODEN: JBBMDG; ISSN: 0165-022X
PB Elsevier Science Ireland Ltd.
DT Journal
LA English
AB We examd. the effect of an elec. **field strength gradient** on DNA sequencing efficiency using capillary array **electrophoresis**. Several types of gradients were applied to DNA sequencing and tested in terms of read length and accuracy. Our original method improved the accuracy of DNA sequencing for longer fragments at high temp.
RE.CNT 18 THERE ARE 18 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L5 ANSWER 4 OF 11 CAPLUS COPYRIGHT 2003 ACS on STN
AN 1999:724523 CAPLUS
DN 132:84243
TI Kinetics of processes in capillary **electrophoresis** under conditions of a longitudinal electric **field strength gradient**
AU Semenov, S. N.
CS Inst. Biokhim. Fiz.im. N. M. Emanuelya, RAN, Moscow, Russia
SO Zhurnal Fizicheskoi Khimii (1999), 73(5), 918-923
CODEN: ZFKHA9; ISSN: 0044-4537
PB MAIK Nauka
DT Journal
LA Russian
AB It is shown that in the system with longitudinal gradient of particles movement velocity a max. peak position depends on parameters on mutual transformation of ionic forms and the system resolving power is best when the peak characteristic dispersion value caused by movement velocity fluctuation due to being in different ionic forms, is equal to zero. It is established that it is possible, for example, when **electrophoretic** mobility of both ionic forms is equal. The capability of the system to sepn. by kinetics parameters is explained by specific mechanisms due to strong non-linear dependence of the peak position on time (most favorable situation with the solving power of the peaks with different reaction time can be for relatively large ions, for example, for proteins for which a diffusion coeff. is relatively small). In an optimal situation it is possible to det. relatively short reaction times (order of hundreds parts of second), which are impossible to study by other transport anal. methods.

L5 ANSWER 5 OF 11 CAPLUS COPYRIGHT 2003 ACS on STN
AN 1999:127908 CAPLUS
DN 130:322577
TI The Use of Poly(2-acrylamido-2-methyl-1-propanesulfonic Acid) Polymers as

Spacers for Isotachophoresis in Sieving Gel Matrixes
AU Bellini, Marco P.; Manchester, Keith L.
CS Department of Biochemistry, University of the Witwatersrand, Johannesburg, S. Afr.
SO Analytical Biochemistry (1999), 268(1), 21-29
CODEN: ANBCA2; ISSN: 0003-2697
PB Academic Press
DT Journal
LA English
AB The elec. **field strength gradients** generated in isotachophoresis (ITP) may be used for the sepn. of biomols. Poly(2-acrylamido-2-methyl-1-propanesulfonic acid) (polyAMPS) polymers of a uniform distribution of mol. mass were synthesized and used as novel spacers in ITP. Since these polymeric spacers are strongly acidic species, their ionic charges remain const. over a wide pH range, so that their ionic mobilities are governed solely by their mol. masses and not by the pH of the milieu. A modification of ITP known as telescope **electrophoresis** was used to sep. a no. of acidic dyes of varying ionic mobility, using polyAMPS polymers as spacers. The resoln. obtained was superior to that obtained by PAGE, due to the focusing effect of the elec. **field strength gradient**. Since these novel polymeric spacers are designed to operate within sieving medium, it was decided to test their suitability for the sepn. of DNA mols. DNA mols. up to 1000 bp long were successfully resolved, with a similar resoln. to that obtained with conventional PAGE. (c) 1999 Academic Press.
RE.CNT 31 THERE ARE 31 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L5 ANSWER 7 OF 11 CAPLUS COPYRIGHT 2003 ACS on STN
AN 1998:180186 CAPLUS
DN 129:1056
TI Enhanced separation of DNA sequencing products by capillary **electrophoresis** using a stepwise gradient of electric field strength
AU Inoue, Hideko; Tsuhako, Mitsutomo; Baba, Yoshinobu
CS Department of Chemistry, Kobe Pharmaceutical University, Kobe, 658, Japan
SO Journal of Chromatography, A (1998), 802(1), 179-184
CODEN: JCRAEY; ISSN: 0021-9673
PB Elsevier Science B.V.
DT Journal
LA English
AB The effect of the elec. **field strength gradient** on the sepn. of DNA sequencing fragments was investigated. We demonstrate that the stepwise gradient of elec. field improves the sepn. of DNA sequencing fragments more than 500 bases in size and diminishes the anal. time for DNA sequencing of lager DNA fragments. The use of the elec. **field strength gradient** induces an increase in the theor. plate no. as predicted by the theor. formulation discussed in this paper.
RE.CNT 25 THERE ARE 25 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L5 ANSWER 8 OF 11 CAPLUS COPYRIGHT 2003 ACS on STN
AN 1992:564930 CAPLUS
DN 117:164930
TI Enhanced separation of DNA restriction fragments by capillary gel **electrophoresis** using **field strength gradients**
AU Guttman, Andras; Wanders, Bart; Cooke, Nelson
CS Beckman Instrument Inc., Fullerton, CA, 92634, USA
SO Analytical Chemistry (1992), 64(20), 2348-51
CODEN: ANCHAM; ISSN: 0003-2700
DT Journal
LA English
AB The effect of elec. **field strength gradients** on the sepn. of DNA restriction fragments was investigated. As reported earlier, the mobility of different size double-stranded DNA mols. is a function of the applied elec. field which suggests that the use of a

nonuniform (time varying) elec. field may increase the res ing power. In capillary gel **electrophoresis**, enhanced sepn. of DNA restriction fragments .ltoreq.1353 base pairs (bp) in size can be achieved by employing the **field strength gradient** method. The shape of the gradient can be continuous or stepwise over time. Both methods can be used to increase sepn. efficiency and resoln. in capillary gel **electrophoresis** of double-stranded DNA mols.

=>

L12 ANSWER 2 OF 7 CAPLUS COPYRIGHT 2003 ACS
AN 2003:94146 CAPLUS
TI Voltage-controlled separation of proteins by electromobility focusing in a dialysis hollow fiber
AU Wang, Qinggang; Lin, Shu-Ling; Warnick, Karl F.; Tolley, H. Dennis; Lee, Milton L.
CS Department of Chemistry and Biochemistry, Brigham Young University, P.O. Box 25700, Provo, UT, 84602-5700, USA
SO Journal of Chromatography, A (2003), 985(1-2), 455-462
CODEN: JCRAEY; ISSN: 0021-9673
PB Elsevier Science B.V.
DT Journal
LA English
AB Electromobility focusing (EMF) is a relatively new protein sepn. technique that utilizes an elec. **field gradient** and a hydrodynamic flow. Proteins are focused in order of **electrophoretic** mobility at points where their **electrophoretic** migration velocities balance the hydrodynamic flow velocity. Steady state bands are formed along the sepn. channel when **equil**. is reached. Further sepn. and detection can be easily achieved by changing the elec. field profile. In this paper, we describe an EMF system with online UV absorption detection in which the elec. **field gradient** was formed using a dialysis hollow fiber. Protein focusing and preconcn. were performed with this system. Voltage-controlled sepn. was demonstrated using bovine serum albumin and myoglobin as model proteins. The limitations of the current method are discussed, and possible solns. are proposed.

L12 ANSWER 4 OF 7 CAPLUS COPYRIGHT 2003 ACS
AN 1998:169696 CAPLUS
DN 128:164594
TI Protein Focusing in a Conductivity Gradient
AU Greenlee, Robert D.; Ivory, Cornelius F.
CS Department of Chemical Engineering, Washington State University, Pullman, WA, 99164-2710, USA
SO Biotechnology Progress (1998), 14(2), 300-309
CODEN: BIPRET; ISSN: 8756-7938
PB American Chemical Society
DT Journal
LA English
AB Cond. gradient focusing (CGF) is one of a family of gradient focusing techniques, characterized by two opposing forces which produce a dynamic **equil**. and which are able to simultaneously sep. and conc. proteins. In CGF, the two counteracting forces result from a const. convective flow of buffer opposed by an elec. **field gradient**. This gradient in the elec. field is formed by gradually decreasing buffer cond., i.e., when a slow-moving, relatively high cond. buffer is dialyzed against a low cond. purge buffer. This paper presents the design of an anal.-scale CGF device and the results of several expts. with colored proteins, both in free soln. and with the use of a 45 .mu.m size-exclusion (SEC) packing to decrease dispersion. Exptl. results with Hb suggest that CGF may one day be capable of resolving proteins with small charge differences. A linear computer model of cond. gradient focusing is derived, and some suggestions are made for further development of this new **electrophoretic** method.

=>

L13 ANSWER 1 OF 5 CAPLUS COPYRIGHT 2003 ACS
AN 2003:94146 CAPLUS
TI Voltage-controlled separation of proteins by **electromobility focusing** in a dialysis hollow fiber
AU Wang, Qinggang; Lin, Shu-Ling; Warnick, Karl F.; Tolley, H. Dennis; Lee, Milton L.
CS Department of Chemistry and Biochemistry, Brigham Young University, P.O. Box 25700, Provo, UT, 84602-5700, USA
SO Journal of Chromatography, A (2003), 985(1-2), 455-462
CODEN: JCRAEY; ISSN: 0021-9673
PB Elsevier Science B.V.
DT Journal
LA English
AB **Electromobility focusing** (EMF) is a relatively new protein sepn. technique that utilizes an elec. field gradient and a hydrodynamic flow. Proteins are focused in order of electrophoretic mobility at points where their electrophoretic migration velocities balance the hydrodynamic flow velocity. Steady state bands are formed along the sepn. channel when equil. is reached. Further sepn. and detection can be easily achieved by changing the elec. field profile. In this paper, we describe an EMF system with online UV absorption detection in which the elec. field gradient was formed using a dialysis hollow fiber. Protein focusing and preconcn. were performed with this system. Voltage-controlled sepn. was demonstrated using bovine serum albumin and myoglobin as model proteins. The limitations of the current method are discussed, and possible solns. are proposed.

L13 ANSWER 2 OF 5 CAPLUS COPYRIGHT 2003 ACS
AN 2002:565156 CAPLUS
DN 137:225853
TI Equilibrium Gradient Methods with Nonlinear Field Intensity Gradient: A Theoretical Approach
AU Tolley, H. Dennis; Wang, Qinggang; LeFebre, David A.; Lee, Milton L.
CS Departments of Statistics Chemistry and Biochemistry, Brigham Young University, Provo, UT, 84602-5700, USA
SO Analytical Chemistry (2002), 74(17), 4456-4463
CODEN: ANCHAM; ISSN: 0003-2700
PB American Chemical Society
DT Journal
LA English
AB Equil. gradient methods belong to a family of sepn. techniques in which analytes are forced to unique equil. points by a force gradient and a counter force along the sepn. pathway. The basic theory for equil. gradient methods where the force gradient is induced by a field gradient is developed. The results indicate that peak capacity can be dynamically improved by using a nonlinear field-intensity gradient in which the 1st section is steep, and the following section is shallow. Using **electromobility focusing** (EMF) as an example, a sepn. model is established. EMF is an equil. gradient method that uses an elec. field intensity gradient to induce a force gradient on charged analytes, such as proteins, and a const. hydrodynamic flow as an opposing force. Equations relating operating parameters with sepn. performance are given. Although simulation results show that a peak capacity of over 10,000 is theor. possible using a single channel in a sepn. time just under 2 mo, if 100 parallel sepn. units were used in an array format under the same operating conditions, the same peak capacity can be obtained in just over 12 h.
RE.CNT 20 THERE ARE 20 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

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L17 ANSWER 10 OF 185 CAPLUS COPYRIGHT 2003 ACS
AN 2001:611797 CAPLUS
TI Device and method for focusing solutes in an electric **field gradient**
IN Ivory, Cornelius F.; Huang, Zheng; Schuetze, Fred J.
PA Washington State University Research Foundation, USA
SO U.S., 46 pp.
CODEN: USXXAM
DT Patent
LA English
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 6277258	B1	20010821	US 1999-306645	19990506
	US 2002043462	A1	20020418	US 2001-885439	20010619
PRAI	US 1998-84505P	P	19980506		
	US 1999-306645	A1	19990506		

AB An **electrophoretic** device and method for focusing a charged solute is disclosed. The device includes a first chamber for receiving a fluid medium, the first chamber having an inlet for introducing a first liquid to the chamber and an outlet for exiting the first liquid from the chamber; a second chamber comprising an electrode array, the second chamber having an inlet for introducing a second liquid to the chamber and an outlet for exiting the second liquid from the chamber; and a porous material separating the first and second chambers. The device's electrode array includes a plurality of electrodes and generates an electric **field gradient** profile which can be dynamically controlled. In the method, a charged solute is introduced into a fluid medium followed by the application of a hydrodynamic force. Opposing the hydrodynamic force with an electric **field gradient** results in solute focusing in the fluid medium. The electric **field gradient** is generated by an electrode array by-individu ally adjusting the electrode voltages.
RE.CNT 10 THERE ARE 10 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L17 ANSWER 12 OF 185 CAPLUS COPYRIGHT 2003 ACS
AN 2001:239424 CAPLUS
DN 136:32257
TI Enhanced throughput for DNA sequencing by capillary array **electrophoresis** with a **gradient** of electric **field** strength
AU Yoshida, C.; Endo, Y.; Baba, Y.
CS Department of Medicinal Chemistry, Faculty of Pharmaceutical Sciences, The University of Tokushima, Tokushima, Shomachi, 770-8505, Japan
SO European Journal of Pharmaceutical Sciences (2001), 13(1), 99-103
CODEN: EPSCED; ISSN: 0928-0987
PB Elsevier Science Ireland Ltd.
DT Journal
LA English
AB The effect of elec. **field gradients** are examd. on the speed, selectivity, read length, and accuracy for DNA sequencing using capillary array **electrophoresis**. Modified elec. **field gradients** was realized to read over 800 bases within 140 min. The method developed is effectively applicable to single nucleotide polymorphism anal. for genomic drug discovery and pharmacogenomics.
RE.CNT 24 THERE ARE 24 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L17 ANSWER 25 OF 185 CAPLUS COPYRIGHT 2003 ACS
AN 1999:733466 CAPLUS
DN 132:176309
TI DNA sequencing by capillary array **electrophoresis** with an electric **field** strength **gradient**
AU Endo, Y.; Yoshida, C.; Baba, Y.
CS Faculty of Pharmaceutical Sciences, Department of Medicinal Chemistry, The

University of Tokushima, [redacted]machi, Tokushima, Japan
SO Journal of Biochemical and Biophysical Methods (1999), 41([redacted]3), 133-141
CODEN: JBBMDG; ISSN: 0165-022X
PB Elsevier Science Ireland Ltd.
DT Journal
LA English
AB We examd. the effect of an elec. **field** strength **gradient** on DNA sequencing efficiency using capillary array **electrophoresis**. Several types of gradients were applied to DNA sequencing and tested in terms of read length and accuracy. Our original method improved the accuracy of DNA sequencing for longer fragments at high temp.
RE.CNT 18 THERE ARE 18 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L17 ANSWER 26 OF 185 CAPLUS COPYRIGHT 2003 ACS
AN 1999:724523 CAPLUS
DN 132:84243
TI Kinetics of processes in capillary **electrophoresis** under conditions of a longitudinal electric **field** strength **gradient**
AU Semenov, S. N.
CS Inst. Biokhim. Fiz.im. N. M. Emanuelya, RAN, Moscow, Russia
SO Zhurnal Fizicheskoi Khimii (1999), 73(5), 918-923
CODEN: ZFKHA9; ISSN: 0044-4537
PB MAIK Nauka
DT Journal
LA Russian
AB It is shown that in the system with longitudinal gradient of particles movement velocity a max. peak position depends on parameters on mutual transformation of ionic forms and the system resolving power is best when the peak characteristic dispersion value caused by movement velocity fluctuation due to being in different ionic forms, is equal to zero. It is established that it is possible, for example, when **electrophoretic** mobility of both ionic forms is equal. The capability of the system to sepn. by kinetics parameters is explained by specific mechanisms due to strong non-linear dependence of the peak position on time (most favorable situation with the solving power of the peaks with different reaction time can be for relatively large ions, for example, for proteins for which a diffusion coeff. is relatively small). In an optimal situation it is possible to det. relatively short reaction times (order of hundreds parts of second), which are impossible to study by other transport anal. methods.

L17 ANSWER 29 OF 185 CAPLUS COPYRIGHT 2003 ACS
AN 1999:152852 CAPLUS
DN 130:322583
TI Digitally Controlled **Electrophoretic** Focusing
AU Huang, Zheng; Ivory, Cornelius F.
CS Department of Chemical Engineering, Washington State University, Pullman, WA, 99164-2710, USA
SO Analytical Chemistry (1999), 71(8), 1628-1632
CODEN: ANCHAM; ISSN: 0003-2700
PB American Chemical Society
DT Journal
LA English
AB Proteins can be simultaneously sepd. and concd. by applying a const. force and opposing this with a gradient in a second force. In this work, a const. hydrodynamic force is opposed by a gradient in the elec. field which allows charged mols. to focus in order of their apparent **electrophoretic** mobilities. The elec. **field gradient** is established and maintained using an array of electrodes whose voltages are individually monitored and adjusted by a computer-controlled circuit board. The computer-generated elec. **field gradient** allows charged mols. to be focused without using a pH gradient. Since the proteins are not focused at their pIs, ppts. do not form, so focused concns. in excess of 50 mg/mL are not unusual. In addn., since the field shape is dynamically controlled from

the computer on a point-by-point basis, the field profile can be adjusted during a run to improve the resoln. In this paper, the column and controller are described together with exptl. results and a model which illustrates the sepg. power and flexibility of this technique.
RE.CNT 7 THERE ARE 7 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L17 ANSWER 31 OF 185 CAPLUS COPYRIGHT 2003 ACS
AN 1999:62922 CAPLUS
DN 130:247549
TI Simultaneous analysis of genes by capillary **electrophoresis** with a laser-induced fluorescence detector using a stepwise **field** strength **gradient**
AU Sumita, Chinuyo; Tsuhako, Mitsutomo; Baba, Yoshinobu
CS Department of Chemistry, Kobe Pharmaceutical University, Kobe, 658-0003, Japan
SO Chemical & Pharmaceutical Bulletin (1999), 47(1), 111-113
CODEN: CPBTAL; ISSN: 0009-2363
PB Pharmaceutical Society of Japan
DT Journal
LA English
AB A mixt. of polymerase chain reaction (PCR) products, 100, 105, 300, 310, 485, and 500 base pair (bp) DNA fragments, was analyzed by capillary **electrophoresis** equipped with a laser-induced fluorescence detector (CE-LIF) using a stepwise **gradient** of elec. **field** strength. The optimum condition for the anal. of PCR products was 0.5% methylcellulose and 160 V/cm from 0 to 10 min and 270 V/cm from 10 to 17 min. The length (bp) of DNA could be estd. from the relationship between the relative migration time and bp length. The relative std. deviation of DNA size (bp) was <3.5% and the difference from the true value was only 2.4 bp.
RE.CNT 16 THERE ARE 16 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L17 ANSWER 37 OF 185 CAPLUS COPYRIGHT 2003 ACS
AN 1998:180186 CAPLUS
DN 129:1056
TI Enhanced separation of DNA sequencing products by capillary **electrophoresis** using a stepwise **gradient** of electric **field** strength
AU Inoue, Hideko; Tsuhako, Mitsutomo; Baba, Yoshinobu
CS Department of Chemistry, Kobe Pharmaceutical University, Kobe, 658, Japan
SO Journal of Chromatography, A (1998), 802(1), 179-184
CODEN: JCRAEY; ISSN: 0021-9673
PB Elsevier Science B.V.
DT Journal
LA English
AB The effect of the elec. **field** strength **gradient** on the sepn. of DNA sequencing fragments was investigated. We demonstrate that the stepwise **gradient** of elec. **field** improves the sepn. of DNA sequencing fragments more than 500 bases in size and diminishes the anal. time for DNA sequencing of lager DNA fragments. The use of the elec. **field** strength **gradient** induces an increase in the theor. plate no. as predicted by the theor. formulation discussed in this paper.
RE.CNT 25 THERE ARE 25 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L17 ANSWER 40 OF 185 CAPLUS COPYRIGHT 2003 ACS
AN 1997:683540 CAPLUS
DN 128:40009
TI Migration and broadening of zone in arbitrary multi-step **gradient** **field** capillary gel **electrophoresis**
AU Lin, Bingcheng; Xu, Xu; Luo, Guoan
CS Dalian Institute Chemical Physics, Chinese Academy Sciences, Dalian, 116012, Peop. Rep. China
SO Fenxi Ceshi Xuebao (1997), 16(1), 58-63

CODEN: FCEXES; ISSN: 1004-957
PB Fenxi Ceshi Xuebao Bianjibu
DT Journal
LA Chinese
AB It was found by using a home-made capillary gel **electrophoresis** column that the mobility of the component is approx. in proportion to the elec. field. The reasons were discussed. A computer program for calcg. migration time and distance of components in arbitrary multi-step **gradient field** capillary gel **electrophoresis** was compiled based on the results.

L17 ANSWER 42 OF 185 CAPLUS COPYRIGHT 2003 ACS
AN 1997:504305 CAPLUS
DN 127:214368
TI A novel analytical technique by focusing **electrophoresis**
AU Tian, Z.W.; Lin, H.S.; Chen, D.Y.; Zhou, Y.L.; Mao, B.W.; Chen, H.
CS State Key Lab. for Physical Chemistry of Solid Surfaces and Chemistry Department, Xiamen University, Xiamen, 361005, Peop. Rep. China
SO Proceedings - Electrochemical Society (1997), 97-19(Chemical and Biological Sensors and Analytical Electrochemical Methods), 319-323
CODEN: PESODO; ISSN: 0161-6374
PB Electrochemical Society
DT Journal
LA English
AB The authors present a novel anal. technique by focusing **electrophoresis** which was proved successfully in the authors' lab. The principle of the technique is based on a **gradient** elec. **field** which was realized by introducing the authors' specially designed and fabricated solid ionic conductor. The technique is of the same applicability as that of CZE, not only restricted to the protein like big mols., with greatly improved sepn. and enrichment efficiencies. Also, the tube length and the working voltage are reduced significantly. The problems mentioned above can be avoided or solved by using this technique.

L17 ANSWER 64 OF 185 CAPLUS COPYRIGHT 2003 ACS
AN 1993:182500 CAPLUS
DN 118:182500
TI Programmable **electrophoresis** with integrated and multiplexed control
IN Serwer, Philip; Dunn, Frederick J.
PA University of Texas System, USA
SO U.S., 13 pp.
CODEN: USXXAM
DT Patent
LA English
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI US 5185071	A	19930209	US 1990-605796	19901030
PRAI US 1990-605796		19901030		

AB A user-programmable device, for horizontal gel **electrophoresis**, can both accurately and programmably control (a) the angle between the elec. field and gel by use of a rotatable gel bed; (b) magnitude of the elec. field; and (c) temp. The device is programmable by a microprocessor-based control board which sends control signals to (a) a motor attached to the rotatable gel; (b) the source of elec. potential; and (c) Peltier devices attached to the sides of buffer chambers horizontally displaced from the rotatable gel bed. This device is particularly appropriate for lowering cost, lowering footprint, reducing heat dissipated, maintaining close tolerances of elec. **field gradients** and temp., and exploring and using thus far untried modes of elec. field variation. It is thereby suitable for analyzing large linear DNA, open circular DNA and/or DNA-protein complexes. Control of several disks, power supplies and temp. cells by one control board (multiplexing) is an option.

L17 ANSWER 67 OF 185 CAPLUS COPYRIGHT 2003 ACS

AN 1992:564930 CAPLUS
DN 117:164930
TI Enhanced separation of DNA restriction fragments by capillary gel **electrophoresis** using **field** strength **gradients**
AU Guttman, Andras; Wanders, Bart; Cooke, Nelson
CS Beckman Instrument Inc., Fullerton, CA, 92634, USA
SO Analytical Chemistry (1992), 64(20), 2348-51
CODEN: ANCHAM; ISSN: 0003-2700
DT Journal
LA English
AB The effect of elec. **field** strength **gradients** on the sepn. of DNA restriction fragments was investigated. As reported earlier, the mobility of different size double-stranded DNA mols. is a function of the applied elec. field which suggests that the use of a nonuniform (time varying) elec. field may increase the resolving power. In capillary gel **electrophoresis**, enhanced sepn. of DNA restriction fragments .ltoreq.1353 base pairs (bp) in size can be achieved by employing the **field** strength **gradient** method. The shape of the gradient can be continuous or stepwise over time. Both methods can be used to increase sepn. efficiency and resoln. in capillary gel **electrophoresis** of double-stranded DNA mols.

L17 ANSWER 104 OF 185 CAPLUS COPYRIGHT 2003 ACS
AN 1989:36374 CAPLUS
DN 110:36374
TI Electric **field gradients** and band sharpening in DNA gel **electrophoresis**
AU Slater, Gary W.; Noolandi, Jaan
CS Xerox Res. Cent. Canada, Mississauga, ON, L5K 2L1, Can.
SO Electrophoresis (1988), 9(10), 643-6
CODEN: ELCTDN; ISSN: 0173-0835
DT Journal
LA English
AB A math. study of the effect of nonuniform elec. fields on the width of DNA **electrophoretic** bands is presented. Using a simple model, the authors show that **field gradients** sharpen these bands during an expt. if the corresponding gradient of **electrophoretic** velocity is large enough. This is an agreement with exptl. results indicating that narrower bands form when pulsed field **electrophoresis** is carried out in the presence of **field gradients**. Moreover, it is shown that there is in fact an optimal exptl. duration that maximizes sepn. Finally, gradients are also predicted to reduce the relative mobilities of the DNA fragments, which is a serious drawback of this technique.

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L3 ANSWER 3 OF 45 CAPLUS COPYRIGHT 2003 ACS
AN 2002:78052 CAPLUS
DN 137:151883
TI Electrically driven separation processes: analytical and preparative methods
AU **Ivory, Cornelius F.**
CS Washington State University, Pullman, WA, USA
SO Separation and Purification Methods (2001), 30(2), 265-311
CODEN: SPMHBD; ISSN: 0360-2540
PB Marcel Dekker, Inc.
DT Journal; General Review
LA English
AB A review on electrokinetic sepns. Electrophoresis has been used to purify small batch samples and has been widely adapted to difficult purifn. problems due to its high resolving power, ubiquity of application, and ease of use. Appropriately modified for full-scale use, these techniques will find industrial application in the purifn. of biomaterials. The key to large-scale electrophoresis is the combination of novel ideas with careful anal. of the phys. and chem. characteristics of the process.
RE.CNT 94 THERE ARE 94 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L3 ANSWER 7 OF 45 CAPLUS COPYRIGHT 2003 ACS
AN 2000:651105 CAPLUS
DN 133:331568
TI A brief review of alternative electrofocusing techniques
AU **Ivory, C. F.**
CS Department of Chemical Engineering, Washington State University, Pullman, WA, 99164-2710, USA
SO Separation Science and Technology (2000), 35(11), 1777-1793
CODEN: SSTEDS; ISSN: 0149-6395
PB Marcel Dekker, Inc.
DT Journal; General Review
LA English
AB A review with 27 refs. Isoelec. focusing (IEF) is an excellent tool at anal. scales but has some drawbacks at preparative and process scales. Alternative electrofocussing methods have been around for over a decade but have only recently reached the point where they can begin to compete head-to-head with IEF. This paper describes some of the advances made in this field since the mid-1980s and shows how they are related to IEF by a common math. expression. In addn., one new technique is described which allows real-time computer-control of the focusing gradient.
RE.CNT 27 THERE ARE 27 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L3 ANSWER 12 OF 45 CAPLUS COPYRIGHT 2003 ACS
AN 1999:152852 CAPLUS
DN 130:322583
TI Digitally Controlled Electrophoretic Focusing
AU Huang, Zheng; **Ivory, Cornelius F.**
CS Department of Chemical Engineering, Washington State University, Pullman, WA, 99164-2710, USA
SO Analytical Chemistry (1999), 71(8), 1628-1632
CODEN: ANCHAM; ISSN: 0003-2700
PB American Chemical Society
DT Journal
LA English
AB Proteins can be simultaneously sepd. and concd. by applying a const. force and opposing this with a gradient in a second force. In this work, a const. hydrodynamic force is opposed by a gradient in the elec. field which allows charged mols. to focus in order of their apparent electrophoretic mobilities. The elec. field gradient is established and maintained using an array of electrodes whose voltages are individually monitored and adjusted by a computer-controlled circuit board. The computer-generated elec. field gradient allows charged mols. to be focused without using a pH gradient. Since the proteins are not focused at their

pIs, ppts. do not form[redacted] focused concns. in excess of[redacted] mg/mL are not unusual. In addn., since the field shape is dynamically controlled from the computer on a point-by-point basis, the field profile can be adjusted during a run to improve the resoln. In this paper, the column and controller are described together with exptl. results and a model which illustrates the sepg. power and flexibility of this technique.
RE.CNT 7 THERE ARE 7 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L3 ANSWER 14 OF 45 CAPLUS COPYRIGHT 2003 ACS
AN 1998:169696 CAPLUS
DN 128:164594
TI Protein Focusing in a Conductivity Gradient
AU Greenlee, Robert D.; **Ivory, Cornelius F.**
CS Department of Chemical Engineering, Washington State University, Pullman, WA, 99164-2710, USA
SO Biotechnology Progress (1998), 14(2), 300-309
CODEN: BIPRET; ISSN: 8756-7938
PB American Chemical Society
DT Journal
LA English
AB Cond. gradient focusing (CGF) is one of a family of gradient focusing techniques, characterized by two opposing forces which produce a dynamic equil. and which are able to simultaneously sep. and conc. proteins. In CGF, the two counteracting forces result from a const. convective flow of buffer opposed by an elec. field gradient. This gradient in the elec. field is formed by gradually decreasing buffer cond., i.e., when a slow-moving, relatively high cond. buffer is dialyzed against a low cond. purge buffer. This paper presents the design of an anal.-scale CGF device and the results of several expts. with colored proteins, both in free soln. and with the use of a 45 .mu.m size-exclusion (SEC) packing to decrease dispersion. Exptl. results with Hb suggest that CGF may one day be capable of resolving proteins with small charge differences. A linear computer model of cond. gradient focusing is derived, and some suggestions are made for further development of this new electrophoretic method.

L3 ANSWER 15 OF 45 CAPLUS COPYRIGHT 2003 ACS
AN 1996:675832 CAPLUS
DN 125:296514
TI Field Gradient Focusing: A Novel Method for Protein Separation
AU Koegler, Wendy S.; **Ivory, Cornelius F.**
CS Department of Chemical Engineering, Washington State University, Pullman, WA, 99164-2710, USA
SO Biotechnology Progress (1996), 12(6), 822-836
CODEN: BIPRET; ISSN: 8756-7938
PB American Chemical Society
DT Journal
LA English
AB Equil. gradient techniques constitute a class of sepn. methods that combine the steps of sepn. and concn. by using a gradient in one or more counteracting forces to create a stable equil. point at which a protein can focus. Different proteins focus at different equil. points, creating a steady-state distribution of isolated proteins. Equil. gradient techniques can be adapted to a specific sepn. by choosing appropriate counteracting forces based on differences in the phys. properties of the proteins involved. Zone elec. field gradient focusing (FGF) is a new addn. to this class of sepn. techniques with the unique property of using a gradient in the elec. field to establish an equil. point instead of using a gradient in the velocity or pH. This paper presents two math. models which can be used to predict the steady-state concn. profiles obtained by zone elec. field gradient focusing. The first model applies only at very low protein concns. where nonlinear effects can be ignored, e.g., less than 1 mg/mL, but it can be solved anal. and is useful in understanding the basic principles engendered in the method. The second model applies at all concns. and allows for variations in the elec. field strength where the protein focuses, but requires numerical soln. The design of an exptl. device is also reported, as well as the results of two

expts.: (1) the focusi[redacted]of the protein Hb from a dil. [redacted]n. and (2) the sepn. of different oxid[redacted]. states of the protein myoglobin.

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2 7 bib ab

09/526,920

L3 ANSWER 2 OF 8 CAPLUS COPYRIGHT 2003 ACS
AN 2002:395417 CAPLUS
DN 137:194676
TI Analytical **equilibrium gradient** methods
AU Wang, Qinggang; Tolley, H. Dennis; LeFebre, David A.; Lee, Milton L.
CS Department of Chemistry and Biochemistry, Brigham Young University, Provo, UT, 84602-5700, USA
SO Analytical and Bioanalytical Chemistry (2002), 373(3), 125-135
CODEN: ABCNBP; ISSN: 1618-2642
PB Springer-Verlag
DT Journal; General Review
LA English
AB A review. Anal. equil. gradient methods are nonlinear sepn. methods in which the sepn. mechanism involves a force gradient along the sepn. channel. These methods can be classified into two categories: those in which the gradient is a field gradient applied along the sepn. channel (i.e., field gradient), and those in which the channel is subjected to a const. field with a gradient formed in some other property (i.e., const. field). Std. deviation of peak width, resoln. and peak capacity are important parameters in characterizing equil. gradient methods, and general expressions can be obtained from considering both the point of force acting on the analyte and the basic flux equation. Several successful examples, such as d. gradient sedimentation, isoelec. focusing and electromobility focusing are discussed. Based on equil. gradient methods in the field gradient category, a method to dynamically improve peak capacity is described. An example of such an approach is given using electromobility focusing.
RE.CNT 65 THERE ARE 65 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L3 ANSWER 7 OF 8 CAPLUS COPYRIGHT 2003 ACS
AN 1971:80149 CAPLUS
DN 74:80149
TI Resolution and peak capacity in **equilibrium-gradient** methods of separation
AU Giddings, J. Calvin; Dahlgren, Karin
CS Dep. Chem., Univ. Utah, Salt Lake City, UT, USA
SO Separation Science (1971), 6(3), 345-56
CODEN: SESCAI; ISSN: 0037-2366
DT Journal
LA English
AB The relative resolving power of the equil.-gradient sepn. methods, such as isoelec. focusing and d.-gradient sedimentation, and the corresponding kinetic methods, such as **electrophoresis** and kinetic centrifugation, is theoretically anal. and general and specific equations are derived for resoln. and peak capacity. The peak capacity, the most general index of overall resulting power, is of comparable magnitude for these 2 methods. New equil.-gradient methods of sepn. are proposed which are dielec. and thermal diffusion forces.

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09/526,920

L9 ANSWER 20 OF 47 CAPLUS COPYRIGHT 2003 ACS
AN 1997:404326 CAPLUS
DN 127:106107
TI Improved capillary **electrophoretic** separations associated with controlling electroosmotic flow
AU **Lee, Cheng S.**
CS Department of Chemistry and Ames Laboratory, Iowa State University, Ames, IA, USA
SO Handbook of Capillary Electrophoresis (2nd Edition) (1997), 717-739. Editor(s): Landers, James P. Publisher: CRC, Boca Raton, Fla. CODEN: 64OZAB
DT Conference; General Review
LA English
AB A review with 51 refs. discussing electroosmotic control in capillary zonal **electrophoresis** and electroosmotic gradient elution in micellar electrokinetic chromatog.

L9 ANSWER 35 OF 47 CAPLUS COPYRIGHT 2003 ACS
AN 1995:981071 CAPLUS
DN 124:66738
TI Electroosmotic control of chiral separation in capillary zone **electrophoresis**
AU Hong, Shencai; **Lee, Cheng S.**
CS Department Chemistry and Ames Laboratory, Iowa State University, Ames, IA, USA
SO Electrophoresis (1995), 16(11), 2132-6 CODEN: ELCTDN; ISSN: 0173-0835
PB VCH
DT Journal
LA English
AB The resoln. in capillary zone **electrophoresis** (CZE), with the assumption of diffusion control only, is strongly dependent on the direction and magnitude of electroosmotic flow. In fact, excellent sepn. resoln. will be obtained if the electroosmotic flow is in the opposite direction of the **electrophoretic** migration. By applying various radial elec. potential gradients across the capillary wall, the direct control of the .zeta. potential and the electroosmotic flow results in a great enhancement of chiral resoln. in cyclodextrin-modified CZE. All 12 basic chiral drugs, including ephedrine, pseudoephedrine, norephedrine, epinephrine, norepinephrine, and isoproterenol, are sepd. and resolved within 22 min of the anal. time. There is no addnl. band broadening and dispersion introduced by the direct control of electroosmosis with the application of various radial elec. potential gradients.

L9 ANSWER 38 OF 47 CAPLUS COPYRIGHT 2003 ACS
AN 1994:72744 CAPLUS
DN 120:72744
TI Direct control of electroosmotic flow in capillary **electrophoresis** by using an external electric field
AU Tsai, Pei; **Lee, Cheng S.**
CS Univ. Maryland, Baltimore, MD, USA
SO Chromatographic Science Series (1993), 64(Capillary Electrophoresis Technology), 475-88 CODEN: CHGSAL; ISSN: 0069-3936
DT Journal
LA English
AB A phys. method involving the use of an addnl. elec. field applied from outside of the capillary for the direct control of the zeta potential and the electroosmotic flow is proposed and demonstrated. Factors, such as capillary dimensions and soln. conditions, affecting the direct control of electroosmosis are analyzed both exptl. and theor. with the capacitor theory. This method is applicable to both bare silica capillary and capillary with various surface coatings. Significant improvements on the sepn. efficiency and resoln. of proteins in CZE and PTH-amino acids in MECC are established by simply controlling the zeta potential and the electroosmotic flow with the application of an external elec. field.

L9 ANSWER 40 OF 47 CAPLUS COPYRIGHT 2003 ACS
AN 1993:611446 CAPLUS
DN 119:211446
TI Mechanistic studies of electroosmotic control at the capillary-solution interface
AU Huang, Tung Liang; Tsai, Pei; Wu, Chin Tiao; **Lee**, **Cheng S.**
CS Dep. of Chem. Biochem. Eng., Univ. of Maryland, Baltimore, MD, 21228, USA
SO Analytical Chemistry (1993), 65(20), 2887-93
CODEN: ANCHAM; ISSN: 0003-2700
DT Journal
LA English
AB The electrokinetic phenomena at the silica-soln. interface under the influence of applied radial elec. potential gradient were analyzed by a theory based on the Gouy-Chapman-Stern-Grahame (GCSG) model and the induced effect across the capillary wall. The effect of adsorbed ions at the silica-soln. interface on the direct control of electroosmosis was studied with the application of Li+ ions, Sn(IV) ions, and dodecyltrimethylammonium bromide (DTAB). In addn., various org. coatings (including Bu phase, amino phase, and (glycidoxypropyl)trimethoxysilane-C2H4 glycol diglycidyl ether (GOX-EDGE)) were used for studying the effect of surface deactivation on the direct control of electroosmosis. The fundamental relation between the microenvironment at the silica-soln. interface and the direct control of electroosmosis obtained from the exptl. and theor. results is discussed.

L9 ANSWER 41 OF 47 CAPLUS COPYRIGHT 2003 ACS
AN 1993:67590 CAPLUS
DN 118:67590
TI Dispersion studies of capillary **electrophoresis** with direct control of electroosmosis
AU Wu, Chin Tiao; Huang, Tung Liang; **Lee**, **Cheng S.**; Miller, Cary J.
CS Dep. Chem. Biochem. Eng., Univ. Maryland, Baltimore Cty., Baltimore, MD, 21228, USA
SO Analytical Chemistry (1993), 65(5), 568-71
CODEN: ANCHAM; ISSN: 0003-2700
DT Journal
LA English
AB The .zeta. potential and the electroosmotic flow in capillary **electrophoresis** can be controlled directly by using a radial elec. potential gradient across the capillary wall. Flow profiles and dispersion in the capillary were studied with direct control of electroosmosis. The exptl. total spatial variance is in good agreement with predictions based only on mol. diffusion. There is no measurable addnl. dispersion and band broadening induced by direct control of electroosmosis. A d.c. short circuit phenomenon at the capillary/soln. interface is proposed to explain the exptl. observations.

L9 ANSWER 42 OF 47 CAPLUS COPYRIGHT 2003 ACS
AN 1992:583781 CAPLUS
DN 117:183781
TI Ionized air for applying radial potential gradient in capillary **electrophoresis**
AU Wu, Chin Tiao; **Lee**, **Cheng S.**; Miller, Cary J.
CS Dep. Chem. Biochem. Eng., Univ. Maryland, Baltimore, MD, 21228, USA
SO Analytical Chemistry (1992), 64(19), 2310-11
CODEN: ANCHAM; ISSN: 0003-2700
DT Journal
LA English
AB The .zeta. potential and the electroosmotic flow in capillary **electrophoresis** can be directly and dynamically controlled by using a radical potential gradient across the capillary wall. The use of ionized air as the conductive medium for applying a radial potential gradient is presented. The air around the capillary tubing is ionized by the .alpha. particles emitted from polonium doped radioactive strips which are placed underneath the capillary tubing. The use of ionized air has the advantage of high resistivity (less heating) and simplicity in the

exptl. design over the external buffer soln. and resistive coatings as the conductive medium for applying a radial potential gradient in capillary **electrophoresis**.

L9 ANSWER 43 OF 47 CAPLUS COPYRIGHT 2003 ACS
AN 1992:147344 CAPLUS
DN 116:147344
TI Effect of direct control of electroosmosis on peptide and protein separations in capillary **electrophoresis**
AU Wu, Chin Tiao; Lopes, Teresa; Patel, Bhisma; **Lee, Cheng S.**
CS Dep. Chem. Biochem. Eng., Univ. Maryland, Baltimore, MD, 21228, USA
SO Analytical Chemistry (1992), 64(8), 886-91
CODEN: ANCHAM; ISSN: 0003-2700
DT Journal
LA English
AB The sepns. of peptide and protein mixts. in capillary zone **electrophoresis** (CZE) at various soln. conditions were studied with the direct control of electroosmosis. The .zeta. potential at the aq./capillary interface and the resulting electroosmosis in the presence of an elec. field were directly controlled by using an addn. elec. field applied from outside of the capillary. The controlled electroosmotic flow affected the migration time and zone resoln. of peptide and protein mixts. The changes in the magnitude and polarity of the .zeta. potential caused the various degrees of peptide and protein adsorption onto the capillary through the electrostatic interactions. The sepn. efficiencies of peptide and protein mixts. were enhanced due to the redn. in peptide and protein adsorption at the capillary wall. The direct manipulations of the sepn. efficiency and resoln. of peptide and protein mixts. in CZE were demonstrated by simply controlling the .zeta. potential and the electroosmotic flow with the application of an external elec. field.

L9 ANSWER 44 OF 47 CAPLUS COPYRIGHT 2003 ACS
AN 1991:669590 CAPLUS
DN 115:269590
TI Analysis of separation efficiency in capillary **electrophoresis** with direct control of electroosmosis by using an external electric field
AU **Lee, Cheng S.**; Wu, Chin Tiao; Lopes, Teresa; Patel, Bhisma
CS Dep. Chem. Biochem. Eng., Univ. Maryland, Baltimore, MD, 21228, USA
SO Journal of Chromatography (1991), 559(1-2), 133-40
CODEN: JOCRAM; ISSN: 0021-9673
DT Journal
LA English
AB Direct control of electroosmosis in capillary **electrophoresis** with the application of an external elec. field is demonstrated by the UV marker method. When the zeta potential at the capillary aq. soln. interface is small, the capacitor model qual. and quant. predicts the effectiveness of the external elec. field for controlling electroosmosis at different electrolyte concns. and capillary dimensions. To investigate the sepn. efficiency of capillary **electrophoresis** with the direct control of electroosmosis, frontal anal. of DMSO as a UV marker is examd. There is no measurable addnl. band broadening induced by the application of an external elec. field.

L9 ANSWER 47 OF 47 CAPLUS COPYRIGHT 2003 ACS
AN 1990:417257 CAPLUS
DN 113:17257
TI Direct control of the electroosmosis in capillary zone **electrophoresis** by using an external electric field
AU **Lee, Cheng S.**; Blanchard, William C.; Wu, Chin Tiao
CS Dep. Chem. Biochem. Eng., Univ. Maryland, Baltimore, MD, 21228, USA
SO Analytical Chemistry (1990), 62(14), 1550-2
CODEN: ANCHAM; ISSN: 0003-2700
DT Journal
LA English
AB A system for applying an addnl. elec. field from outside of the capillary in capillary zone **electrophoresis** is described. With the test setup, various elec. potential gradients between the inner and outer elec.

fields were established during the expt. The flow rate of the electroosmosis was enhanced with the application of neg. potential gradient. In contrast, the rates of electroosmotic flow were reduced by applying the pos. potential gradients in the range 0-5 kV. The direction of the electroosmosis was reversed at the higher pos. potential gradient, 6 kV. These preliminary exptl. results indicate that the direction and flow rate of electroosmosis can be directly controlled by simply using an external elec. field.

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09/526,920

L4 ANSWER 2 OF 7 CAPLUS COPYRIGHT 2003 ACS
AN 1991:578866 CAPLUS
DN 115:178866
TI Enhanced capillary zone electrophoresis and apparatus for performance thereof
IN **Blanchard, William C.**; Lee, Cheng S.
PA University of Maryland, USA; Blanchard and Co., Inc.
SO PCT Int. Appl., 21 pp.
CODEN: PIXXD2
DT Patent
LA English
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 9112073	A1	19910822	WO 1991-US721	19910207
	W: CA, JP				
	RW: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LU, NL, SE				
	US 5151164	A	19920929	US 1990-477755	19900209
	CA 2075625	AA	19910810	CA 1991-2075625	19910207
	EP 517733	A1	19921216	EP 1991-904207	19910207
	EP 517733	B1	19960605		
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE				
	JP 05505463	T2	19930812	JP 1991-504511	19910207
	AT 138827	E	19960615	AT 1991-904207	19910207
PRAI	US 1990-477755		19900209		
	WO 1991-US721		19910207		

AB Capillary zone electrophoresis is enhanced by the application of an elec. field across the interior of the capillary tube. This external elec. field is applied through a conductive member at the exterior of the capillary tube. The external field vectorially couples with the internal field, controlling the polarity and the magnitude of the surface (zeta) potential on the interior surface of the capillary. The control of the surface (zeta) potential reduces adsorption of macromols. onto the interior surface of the capillary tube, by inducing electrostatic repulsions between the macromols. and the capillary surface. Addnl., the control of the surface (zeta) potential can retard, and even reverse, electroosmotic flow, depending on the magnitude of those fields. Schematic diagrams of the app. are included. Data are included showing the effect of external elec. field on electroosmosis. The app. is useful for sepn. of biomols., e.g. proteins.

L4 ANSWER 3 OF 7 CAPLUS COPYRIGHT 2003 ACS
AN 1990:417257 CAPLUS
DN 113:17257
TI Direct control of the electroosmosis in capillary zone electrophoresis by using an external electric field
AU Lee, Cheng S.; **Blanchard, William C.**; Wu, Chin Tiao
CS Dep. Chem. Biochem. Eng., Univ. Maryland, Baltimore, MD, 21228, USA
SO Analytical Chemistry (1990), 62(14), 1550-2
CODEN: ANCHAM; ISSN: 0003-2700
DT Journal
LA English
AB A system for applying an addnl. elec. field from outside of the capillary in capillary zone electrophoresis is described. With the test setup, various elec. potential gradients between the inner and outer elec. fields were established during the expt. The flow rate of the electroosmosis was enhanced with the application of neg. potential gradient. In contrast, the rates of electroosmotic flow were reduced by applying the pos. potential gradients in the range 0-5 kV. The direction of the electroosmosis was reversed at the higher pos. potential gradient, 6 kV. These preliminary exptl. results indicate that the direction and flow rate of electroosmosis can be directly controlled by simply using an external elec. field.

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L1 ANSWER 2 OF 11 CAPLUS COPYRIGHT 2003 ACS
AN 1996:72673 CAPLUS
DN 124:129748
TI Field effect at oxide electrode-electrolyte interface
AU **Ghowsi, K.**; Naghshineh, S.; Houlne, M. P.
CS Dep. Chem., Biochem., Texas Tech. Univ., Lubbock, TX, 79409-1061, USA
SO Russian Journal of Electrochemistry (Translation of Elektrokhimiya) (1995), 31(12), 1259-68
CODEN: RJELE3; ISSN: 1023-1935
PB MAIK Nauka/Interperiodica
DT Journal
LA English
AB It is possible to vary the surface charges and potentials in the double layer at the oxide-electrolyte interface by applying a strong elec. field (105-106 V/cm) across the metal-oxide-electrolyte. Two models are proposed for theor. confirmation of the field effect at the oxide-electrolyte interface. The 1st model is an ideal model based on Coulombic interactions of charges at the interface. The 2nd model is based on Healy's site binding model. The field effect at the oxide-electrolyte is employed as the oxide electrode. Application of an elec. field across the length of the capillary and perpendicular to the wall of the capillary, at the crit. elec. field of 1.3 MV/cm, will result in a change of the surface current. This expt. demonstrates the field effect at the oxide-electrolyte interface.

L1 ANSWER 3 OF 11 CAPLUS COPYRIGHT 2003 ACS
AN 1995:262753 CAPLUS
DN 122:121989
TI Reverse direction anion capillary electrophoresis: theory and application
AU Dunn, Connie D.; Hankins, Matthew G.; **Ghowsi, Kiumars**
CS Department of Chemistry and Biochemistry, Texas Tech University, Lubbock, TX, 79409-1061, USA
SO Separation Science and Technology (1994), 29(18), 2419-33
CODEN: SSTEDS; ISSN: 0149-6395
PB Dekker
DT Journal
LA English
AB A new mode for operating capillary electrophoresis for sepn. of anions without using buffer modifiers was demonstrated. Reverse direction anion capillary electrophoresis, as the new mode is designated, was performed on 2 anions, nitrate and nitrite, with similar electrophoretic mobilities at various buffer pH values. Since electroosmotic flow increases as buffer pH is increased, resoln. is poor at low pH and enhanced at neutral to high pH. Model equations are derived for predicting the resoln. and no. of theor. plates for reverse direction anion capillary electrophoresis. From these equations, system efficiency (N) and resoln. are plotted as a function of electroosmotic mobility to illustrate how performance can be improved by an increase in electroosmotic flow.

L1 ANSWER 4 OF 11 CAPLUS COPYRIGHT 2003 ACS
AN 1992:187317 CAPLUS
DN 116:187317
TI Field-effect electroosmosis
IN **Ghowsi, Kiumars**
PA Louisiana State University, Agricultural and Mechanical College, USA
SO U.S., 13 pp.
CODEN: USXXAM
DT Patent
LA English
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI US 5092972	A	19920303	US 1990-552234	19900712
PRAI US 1990-552234		19900712		

AB This app. and process control the rate of electroosmosis due to a 1st elec. potential in an elec. insulating capillary, in which a 2nd elec.

potential is applied between the elec. insulating walls of the capillary and a liq. within the capillary. This 2nd elec. potential changes the charge on the wall of the capillary, and thus allows manipulation of the zeta potential within the capillary, and therefore the rate of electroosmosis.

L1 ANSWER 5 OF 11 CAPLUS COPYRIGHT 2003 ACS
AN 1991:689658 CAPLUS
DN 115:289658
TI Studies in the electrochemistry of insulators and ion transport: anodization, oscillometry, electro-osmosis, and capillary electrophoresis
AU **Ghowsi, Kiumars**
CS Louisiana State Univ. Agric. Mech. Coll., Baton Rouge, LA, USA
SO (1990) 175 pp. Avail.: Univ. Microfilms Int., Order No. DA9123191
From: Diss. Abstr. Int. B 1991, 52(3), 1391
DT Dissertation
LA English
AB Unavailable

L1 ANSWER 6 OF 11 CAPLUS COPYRIGHT 2003 ACS
AN 1991:640804 CAPLUS
DN 115:240804
TI Field effect electroosmosis
AU **Ghowsi, Kiumars**; Gale, Robert J.
CS Dep. Chem. Biochem., Texas Tech Univ., Lubbock, TX, 79409-1061, USA
SO Journal of Chromatography (1991), 559(1-2), 95-101
CODEN: JOCRAM; ISSN: 0021-9673
DT Journal
LA English
AB A novel effect, called field effect electroosmosis, was postulated. By coating the outside of a silica capillary with a conductive layer and applying a perpendicular voltage, VG, across its wall, the zeta potential, can be changed by varying VG. Through flexible control of the zeta potential, the electroosmotic flow can be controlled. This adds a new dimension to capillary electrophoresis (both capillary zone electrophoresis and micellar electrokinetic capillary chromatog.). Some of the advantages, including tuneability, are discussed. Based on this effect, the design of the first electrokinetic transistor, called a metal-insulator-electrolyte-electrokinetic field-effect device (MIEEKFED), was proposed. This device could be used for sepn.-based sensors. It also has great potential for miniaturization, esp. because of the advances that have occurred in the micromachining technol. of silicon. Recently, an exptl. study of the use of an addnl. elec. field outside a capillary to control the zeta potential has been reported. This work provides confirmation of theor. predictions.

L1 ANSWER 7 OF 11 CAPLUS COPYRIGHT 2003 ACS
AN 1991:531126 CAPLUS
DN 115:131126
TI Application of field effect electro-osmosis to separation-based sensors
AU **Ghowsi, Kiumars**; Gale, Robert J.
CS Chem. Dep., Louisiana State Univ., Baton Rouge, LA, 70803, USA
SO Biosens. Technol., [Proc. Int. Symp.] (1990), Meeting Date 1989, 55-62.
Editor(s): Buck, Richard P. Publisher: Dekker, New York, N. Y.
CODEN: 56ZHAF
DT Conference
LA English
AB Development of capillary electrophoresis with smaller capillary diams. for use as chem. sensors, electrokinetic field devices based on capillary field effect electro-osmosis, and potential application for sepn.-based sensors are discussed.

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L10 ANSWER 2 OF 14 CAPLUS COPYRIGHT 2003 ACS
AN 2002:106090 CAPLUS
DN 136:284948
TI **Examination of Theoretical Models in External Voltage Control of Capillary Electrophoresis**
AU Hartley, Nanette K.; **Hayes, Mark A.**
CS Department of Chemistry and Biochemistry and The Center for Solid State Electronics Research, Arizona State University, Tempe, AZ, 85287-1604, USA
SO Analytical Chemistry (2002), 74(6), 1249-1255
CODEN: ANCHAM; ISSN: 0003-2700
PB American Chemical Society
DT Journal
LA English
AB Control of **electroosmosis** by an external voltage in capillaries of varying geometry was examd. and studied. Controlled geometric factors included inner and outer radii, external electrode coverage area, and the method of voltage application. The behavior of the flow in response to the external voltage from earlier work and this study were compared to existing literature models. A noticeable lack of correlation between the current modeling theories and the published data is noted. In light of these results, suggestions for further areas of study of a description of external voltage flow control mechanism are suggested.
RE.CNT 46 THERE ARE 46 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L10 ANSWER 3 OF 14 CAPLUS COPYRIGHT 2003 ACS
AN 2001:432363 CAPLUS
DN 135:101509
TI Microfluidics. Controlling fluids in small places
AU Polson, Nolan A.; **Hayes, Mark A.**
CS Thermo Biostar, USA
SO Analytical Chemistry (2001), 73(11), 312A-319A
CODEN: ANCHAM; ISSN: 0003-2700
PB American Chemical Society
DT Journal; General Review
LA English
AB A review, with 61 refs., is given. Most lab-on-a-chip devices are designed to move and direct fluids. Thus, understanding the principles of microfluidics is essential to developing ever more sophisticated miniature anal. systems. The authors discuss the challenges of microfluidics, list approaches that are being explored, and propose new directions.
RE.CNT 61 THERE ARE 61 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L10 ANSWER 5 OF 14 CAPLUS COPYRIGHT 2003 ACS
AN 2000:335648 CAPLUS
DN 132:336206
TI Practical device for controlling ultrasmall volume flow
IN **Hayes, Mark A.**; Polson, Nolan A.
PA Arizona Board of Regents, USA
SO PCT Int. Appl., 51 pp.
CODEN: PIXXD2
DT Patent
LA English
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI WO 2000028315	A1	20000518	WO 1999-US26724	19991110
W: CA, JP, US				
RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE				
EP 1129345	A1	20010905	EP 1999-958906	19991110
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, FI				
JP 2002529235	T2	20020910	JP 2000-581444	19991110

PRAI US 1998-108086P P 19981112
WO 1999-US26724 W 19991110

AB A device for control of ultrasmall vol. fluid flow used in the fields of **electrophoretic** sepn., chem. anal., and microchem. reactions has a substrate defining a capillary channel and integrated external electrodes to control **electroosmotic** flow. The channel geometry and integrated external electrode proximity reduce the voltage required for control of flow. Longitudinal electrodes provide **electrophoretic** sepn. of components. High dielec. material between the integrated external electrode and capillary reduces the voltage required for the control of flow. Real-time flow monitoring and capillary channel surface coating enhance the control of flow.

RE.CNT 4 THERE ARE 4 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L10 ANSWER 7 OF 14 CAPLUS COPYRIGHT 2003 ACS
AN 2000:86437 CAPLUS
DN 132:145907
TI **Electrophoretic** focusing preconcentration technique using a continuous buffer system for capillary **electrophoresis**
AU Polson, Nolan A.; Savin, Douglas P.; **Hayes, Mark A.**
CS Arizona State University, Tempe, AZ, 85287-1604, USA
SO Journal of Microcolumn Separations (2000), 12(2), 98-106
CODEN: JMSEEJ; ISSN: 1040-7685
PB John Wiley & Sons, Inc.
DT Journal
LA English

AB Detection and anal. of dil. small vol. samples can be achieved by preconcn. techniques. Published techniques use specialized discontinuous buffer systems (sample stacking, field-amplification, and isotachophoresis) or incorporation of a chromatog. preconcn. chamber-capillary. By carefully exploiting flow and elec. fields, preconcn. of analytes can be achieved without the need for discontinuous buffer systems or phys. chromatog. devices. This focusing is achieved by independently controlling pressure flow and **electrophoretic** migration of analytes. Initiation of a voltage field at the immediate entrance of the capillary combined with adjusting bulk flow equal and opposite to the **electrophoretic** migration of the analytes results in preconcn. Data are presented indicating an increase in local concn. of 200 nm carboxylate modified latex spheres within the immediate vol. of the capillary entrance (specifically .apprx. 15 pL) using laser-induced fluorescence detection.

RE.CNT 35 THERE ARE 35 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L10 ANSWER 8 OF 14 CAPLUS COPYRIGHT 2003 ACS
AN 2000:76590 CAPLUS
DN 132:145818
TI **Electroosmotic** Flow Control of Fluids on a Capillary **Electrophoresis** Microdevice Using an Applied External Voltage
AU Polson, Nolan A.; **Hayes, Mark A.**
CS Department of Chemistry and Biochemistry, Arizona State University, Tempe, AZ, 85287-1604, USA
SO Analytical Chemistry (2000), 72(5), 1088-1092
CODEN: ANCHAM; ISSN: 0003-2700
PB American Chemical Society
DT Journal
LA English

AB Independent control of **electroosmosis** is important for sepn. science techniques such as capillary zone **electrophoresis** and for the movement of fluids on microdevices. A capillary **electrophoresis** microdevice is demonstrated which provides more efficient control of **electroosmosis** with an applied external voltage field. The device is fabricated in a glass substrate where a 5.0 cm sepn. channel (30 .mu.m wide) is paralleled with two embedded electrodes positioned 50 .mu.m away in the substrate. With this structure, greatly reduced applied external potentials (.ltoreq.120 V

compared to tens of kilo[illegible]ts) still effectively altered **electroosmosis**. The efficiency for the control of **electroosmosis** by the applied external field is improved by apprx.40 times over published values.

RE.CNT 41 THERE ARE 41 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L10 ANSWER 9 OF 14 CAPLUS COPYRIGHT 2003 ACS
AN 1999:796043 CAPLUS
DN 132:37361
TI Control of flow and materials in microfluidic devices for sample concentration
IN **Hayes, Mark A.**; Polson, Nolan A.
PA Arizona Board of Regents, USA
SO PCT Int. Appl., 31 pp.
CODEN: PIXXD2
DT Patent
LA English
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 9964851	A1	19991216	WO 1999-US13340	19990611
	W: CA, JP, US				
	RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE				
	CA 2328400	AA	19991216	CA 1999-2328400	19990611
	EP 1092147	A1	20010418	EP 1999-927515	19990611
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, FI				
	JP 2002517751	T2	20020618	JP 2000-553795	19990611
PRAI	US 1998-88956P	P	19980611		
	WO 1999-US13340	W	19990611		

AB Methods and devices are described for the control of the movement of fluids and elec. charged sample components, e.g., microspheres, in those fluids, permitting exclusion or concn. of specifically chosen sample components. An anal. device, either a microchip or capillary app., is used, having the means to exclude specific sample components of interest from a capillary or channel for the purpose of preconcn. or control of movement of sample components. The control system includes a means for controlling the flow of the fluid in the channel by placement of an electrode at the immediate entrance of each channel on such devices so that material may be directly manipulated by effects of both bulk flow and elec. driven migration. The **electrophoretic** or **electroosmotic** arrangement can be provided in microchips or capillaries.

RE.CNT 5 THERE ARE 5 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L10 ANSWER 10 OF 14 CAPLUS COPYRIGHT 2003 ACS
AN 1999:577100 CAPLUS
DN 131:190184
TI Chemical surface for control of **electroosmosis** by an applied external voltage field
IN **Hayes, Mark A.**
PA Arizona Board of Regents, USA
SO PCT Int. Appl., 36 pp.
CODEN: PIXXD2
DT Patent
LA English
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 9945377	A1	19990910	WO 1999-US4569	19990303
	W: CA, JP, KR, SG, US				
	RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE				
	CA 2323053	AA	19990910	CA 1999-2323053	19990303

EP 1060389 A1 2[redacted]1220 EP 1999-912243 19[redacted]303
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, FI
JP 2002505937 T2 20020226 JP 2000-534865 19990303
US 6488831 B1 20021203 US 2000-623233 20000830
PRAI US 1998-76792P P 19980304
US 1998-104383P P 19981015
WO 1999-US4569 W 19990303

AB The present invention is directed to a method for controlling **electroosmotic** flow by treating a surface with an organosilane having a single leaving group and optionally a ceramic oxide. This protective coating allows increased control and stabilization of **electroosmotic** flow by applying a radial voltage field.

RE.CNT 5 THERE ARE 5 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L10 ANSWER 11 OF 14 CAPLUS COPYRIGHT 2003 ACS
AN 1999:441746 CAPLUS
DN 131:164777
TI Extension of external voltage control of **electroosmosis** to high-pH buffers
AU **Hayes, Mark A.**
CS Department of Chemistry and Biochemistry, Arizona State University, Tempe, AZ, 85287, USA
SO Analytical Chemistry (1999), 71(17), 3793-3798
CODEN: ANCHAM; ISSN: 0003-2700
PB American Chemical Society
DT Journal
LA English
AB Control of **electroosmosis** by an applied external voltage field in capillary **electrophoresis** was limited to buffer pH .apprx.5 or below. This poor control at higher pH is caused by a high d. of surface charge induced by chem. equil. overwhelming the influence of the external voltage-induced charges within the elec. double layer. A tert-butyldiphenylchlorosilane treatment was used on fused-silica capillaries to minimize chem. generated .zeta.-potential where this treatment allowed for control of **electroosmosis** over a large pH range (2-10). Blocking the surface with traditional polymer-based surface treatments does not work in this application since the polymers increase the viscosity within the elec. double layer and impede **electroosmosis**. The surface created by this reaction is demonstrated in extremely narrow capillaries, down to 2-.mu.m internal diam. The treated surface is sterically hindered against acid- and base-catalyzed degrdn. reactions typically assocd. with organosilanes. This results in a surface that was stable to exptl. buffer pH extremes, from pH 3 to pH 10, and was stable for at least 8 wk exposed to both soln. and air.

RE.CNT 46 THERE ARE 46 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

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